Remarks

Entry of the above amendment and following remarks, prior to examination of this Request for Continued Examination application, is respectfully requested. Revisions of claim 6 are supported, for instance, at page 14, lines 5-22 and in Figure 1. No new matter has been added. Claims 6-8 and 10-12 are pending. To the extent any previous rejections are maintained, Applicants respectfully traverse such rejections. Favorable consideration of the above amendment and following comments is respectfully requested.

Claim 6 recites an adsorption column apparatus including an air blower, two adsorption columns, a surge tank and a vacuum pump. The adsorption column apparatus using a two column structure is configured such that oxygen can be continuously collected while employing a surge tank for discharge of product and a vacuum pump to desorb and discharge residue adsorbed by the columns. The two columns alternatively adsorb air from the atmosphere, discharging product into the surge tank and discharge residue or waste through the vacuum pump so that product can be continuously collected. The prior art of record does not teach or suggest the claimed combination of features as required by claim 6.

Furthermore, the claimed invention provides further advantages of an adsorption column where the power consumption can be minimized for the specific diameter of the adsorbent particles used. The equation recited in claim 6 defines the relationship of the superficial velocity and the diameter of adsorbent particles, where the column is formed such that the superficial velocity u [m/s] is set to be within a range of ±25% of $u = 0.07a + 0.095$, wherein "a" [mm] being the diameter of the adsorbent. The superficial velocity determines the structure, namely the shape, of the adsorption columns, such as by factors including a required amount of adsorbent, a sectional area of the respective adsorbent column and a packing height of the adsorbent (page 12, lines 13-23). Thus, the equation of claim 6 determines the superficial velocity suitable for a specific diameter of adsorbent particles selected by a user. This principle is illustrated, for instance, in Figure 4.

As the prior art references do not teach or suggest the features of claim 6, there is no reasonable expectation in the prior art of record that would lead to any advantages provided by the claimed invention. For at least these reasons, it is respectfully submitted that claim 6 is patentable.

Additionally, claims 7-8 and 10-11 depend upon and further limit claim 6. Claim 12 is directed to a pressure swing adsorption system, and includes the same subject matter of claim 6 discussed above as being patentable. Accordingly, it is respectfully submitted that these claims also are patentable over the prior art references of record for at least the reasons discussed above with respect to claim 6.

With the above comments and remarks, Applicants believe that the claims pending in this patent application are in a condition for allowance. Favorable consideration is respectfully requested. If any further questions arise, the Examiner is invited to contact Applicants' representatives at the number listed below.

Respectfully Submitted,

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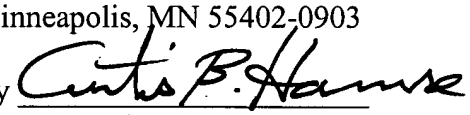
Dated: January 23, 2003

By 

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Version With Markings Showing Changes Made to Application Serial No. 09/858267

6. (Amended) An adsorption column apparatus [packed with an adsorbent] for separating and collecting oxygen from an air by a pressure swing adsorption separation process comprising:

an air blower;

two adsorption columns each connected to the air blower, the adsorption columns each having an adsorbent packed therein;

a surge tank connected with the two adsorption columns that collects discharged oxygen gas from the adsorption columns to be discharged as product;

a vacuum pump connected with the two adsorption columns that desorbs and discharges residue adsorbed by the adsorption columns to regenerate the adsorbent; and

said air blower, two adsorption columns, surge tank and vacuum pump are connected and controlled through a piping and valve system;

wherein the adsorption columns are [an adsorption column that is] formed such that a superficial velocity u [m/s] is set to be within a range of ±25% of $u = 0.07a + 0.095$, wherein "a" [mm] being the diameter of the adsorbent in case of said particles of said adsorbent having a spherical shape, or an equivalent diameter in case of said particles of said adsorbent having a cylindrical shape, an elliptic spherical shape or an elliptic cylindrical shape.

12. (Amended) A pressure swing adsorption separation [apparatus] system, [said apparatus provided with said] comprising: the adsorption column apparatus according to claim 6.